PRH:SBB
VI-2

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON
September 12, 1932.

Letter
Circular LC-344
(superseding #326)

Bureau of Standards, Washington

SOUND ABSORPTION COEFFICIENTS OF THE MORE COMMON MATERIALS.

The following figures have been obtained at the Bureau of Standards for the sound absorption coefficients of a number of materials now on the market as acoustic correctives. The inclusion of a material in this letter circular is not to be construed as a general approval. Each material should be judged on its merits in any particular case as there are other requirements such as fire resisting qualities, light reflection, appearance, etc. Figures are also given for the absorption of an audience seated in chairs of different kinds. All the results have been obtained by the reverberation method. Unless otherwise mentioned, all samples were laid directly on the floor of the reverberation room.

Acoustic correctives may be classified in general as fibrous materials, tiles, and acoustic plasters. Materials of the first two classes are usually supplied in a form which needs no special experience for its application. With acoustic plasters the case is different. If improperly applied the coefficient of absorption may be considerably less than the values here given.

It is not necessarily the case that the materials of highest coefficient are the most advantageous. When there is room enough to apply the requisite quantity, a material of low coefficient will give better results than one of higher absorption, because of the more uniform distribution of material.

For the foregoing reasons it is advisable in drawing up specifications for auditoriums to lay emphasis upon the reverberation time desired rather than upon coefficients of material. See Bureau of Standards Circular No. 396 entitled, Architectural Acoustics, which may be obtained of the Superintendent of Documents, Government Printing Office, Washington, D.C., at 5¢ per copy.

Additional details regarding any of the materials mentioned in this letter circular will be furnished on application.

Material	Absorption coefficients for Frequencies 128	256	512	1024	2048	Date
ABSORBEX(Thermax)Type A(36 gauge) 1"thick painted by mfgr.	-	-	.46	-	-	1932
Ditto, cemented to sheet rock	-	.22	.45	.92	.97	1932
" laid on 1" Thermax	-	.37	.85	1.00	.95	1932
" on 13/16"x2"furring 9"o.c.	-	.27	.66	.99	.81	1932
" " 13/16"x2"furring 9"o.c.which were on 2x4's	-	.58	.90	.62	.88	1932
ABSORBEX(Thermax)Type B(veneered) 1"thick laid on 1" Thermax	-	-	.88	-	-	1932
ABSORBEX Type B 1"thick,spray painted 4 coats lithopone paint on 13/16"x2" furring 9" o.c.	-	.23	.61	.84	.79	1932
Ditto cemented to sheet rock	-	.18	.37	.74	.97	1932
ABSORBEX(Thermax)Type C(14 gauge)	.14	.19	.34	.76	.63	1932
Ditto on 13/16"x2" furring 20" o.c.	.14	.21	.69	.71	.59	1932
ACOUSTEX 1" thick #60	.11	.21	.53	.81	.81	1931
1 1/2" thick #70	.16	.34	.75	.85	.84	1931
Ditto, 6 coats spray paint	.14	.30	.74	.90	.85	1931
ACOUSTIC LIME PLASTER, Finishing Lime Assoc.of Ohio 3/4" thick on base coat lime plaster	.17	.23	.28	.36	.64	1930
ACOUSTOLIC (Maftex)nailed on 2x4's, spaced 2 ft.on centers; Without surface treatment	.44	.24	.31	.44	.48	1930
Tinted with water soluble aniline color		.29	.28	.41		1930
Tinted with water color paint	.40	.33	.31	.38	.37	1930
ACOUSTONE 1/2" thick	.09	.20	.48	.64	.66	1931
3/4" "	.13	.28	.61	.73	.73	1930
1" "	.18	.38	.64	.73	.73	1930
AKOUSTOLITH TILE, Grade D, 1"	.08	.13	.25	.54	.67	1930
" " " D, 2"	.15	.26	.59	.74	.52	1930
" " " B, 1"	.10	.14	.28	.65	.73	1929
" " " C, 1 1/2"	.12	.19	.44	.61	.66	1930
" " " C, 2"	.19	.26	.53	.64	.70	1930
" " " B, 2"	.21	.50	.90	.86	.72	1931
" " " B, 1 1/2"	.14	.30	.69	.92	.87	1932
" " " B, 1"	.09	.17	.46	.81	.81	1932
AKOUSTOLITH PLASTER, 1/4" thick on base coat gypsum plaster	.13	.21	.19	.23	.33	1931
AKOUSTOLITH PLASTER, 1/2" thick on base coat gypsum plaster	.20	.26	.35	.56	.59	1932
ARBORITE, 1/2" thick on 13/16"x2" furring strips, spaced 12" o.c. Low density material,sanded surface	.21	.48	.34	.31	.41	1930
ARBORITE,1/2" thick Regular material, sanded surface,same furring strips	.16	.40	.27	.29	.39	1930

Materials	Absorption coefficients for Frequencies 128	256	512	1024	2048	Date
BALSAM WOOL,1" thick,scrim facing	.18	.36	.55	.65	.67	1928
BALSAM WOOL QUIETILE,1" thick	.12	.24	.63	.76	.76	1931
CALICEL ACOUSTIC TILE, 1" " cemented to plaster board	.26	.38	.74	.91	.78	1932
CELOTEX Single B, 5/8" thick	.08	.18	.48	.63	.75	1931
" " " 4 coats brush painted	.07	.20	.46	.72	.87	1931
CELOTEX Double B,13/16" thick	.15	.24	.62	.76	.73	1931
" " " 4 coats brush painted	.13	.26	.62	.82	.91	1931
CELOTEX Triple B, 1 1/4" thick	.18	.33	.84	.97	.76	1931
CELOTEX MINERAL FIBER, 1 1/4 thick cemented to Sheetrock,unpainted	.22	.32	.84	.80	.87	1931
Ditto 1 1/4" thick brush painted, 2 coats	.19	.45	.92	.81	.63	1931
CERAMACOUSTIC TILE 1 1/8"thick cemented to Sheetrock	.34	.48	.64	.67	.66	1932
Ditto Spray painted 4 coats	.28	.49	.62	.63	.68	1932
CORKOUSTIC, Type C, 1 1/2" thick	.08	.14	.61	.56	.64	1931
" " B, 1 1/2" "	.09	.10	.61	.56	.49	1931
EK-O-LESS TILE, 3/4" thick on 1" backing	.22	.31	.67	.87	.78	1932
FLAXLINUM, 1" thick	.09	.31	.62	.77	.69	1930
FLAXLINUM in TMB Tile, on 13/16" x 2" furring strips, spaced 16" o.c. thicknesses as below:						
1/2" Flaxlinum	.11	.19	.58	.68	.69	1930
1" "	.17	.34	.61	.72	.68	1930
1/2" and 1"	.32	.46	.67	.69	.71	1930
2 1" layers Flaxlinum	.41	.59	.70	.72	.74	1930
HACHMEISTER-LIND ACOUSTIC PLASTER on base coat gypsum plaster, stippled with pins 1/2" deep	.16	.19	.25	.36	.44	1930
INSULITE ACOUSTILE TYPE 44, 1 1/2" thick	.26	.42	.50	.57	.61	1931
KALITE ACOUSTIC PLASTER H, 1/2" thick on base coat gypsum plaster	.25	.31	.46	.61	.62	1932
KALITE ACOUSTIC PLASTER A-2, 1/2" thick on base coat gypsum plaster	.24	.23	.28	.48	.70	1932
KALITE ACOUSTIC CEMENT, 3/4" thick, on metal lath with wood studs, no base coat	.34	.46	.49	.52	.73	1931
KALITE TILE, 1 1/2" thick, 1" backing	.15	.32	.50	.52	.40	1931
MACOUSTIC PLASTER, 1/2" thick, on base coat gypsum plaster stippled with large pins, perforations 1/2" deep	.06	.17	.33	.56	.58	1931

The coefficients given in the above table represent the fractional part of the energy of a sound wave which is absorbed at each reflection.

Audience seated in chairs of various types.

A = cane seat chairs, open back
B = theatre chairs, box spring seat, heavily padded back
C = same as B, but single layer of padding on back
D = Church pews, seating five.

Absorption per person[1]	Frequencies				
	128	256	512	1024	2048
Women without coats, A	0.7	1.3	2.3	3.6	4.6
Women with coats, A	1.3	2.4	4.0	5.8	6.7
Men without overcoats, A	1.3	2.1	4.1	5.5	7.4
Men with overcoats, A	2.3	3.2	4.8	6.2	7.6
Mixed audience, B			3.9	4.7	
Empty seat, B		3.4	3.0	3.3	3.6
Mixed audience, C		3.5	4.1	4.9	4.2
Empty seat, C		3.0	2.5	2.9	3.1
Mixed audience, D		2.7	3.3	3.8	3.6

(1) These figures are numerically equal to the number of square feet of a material having unit absorption, which would absorb the same amount of sound energy.